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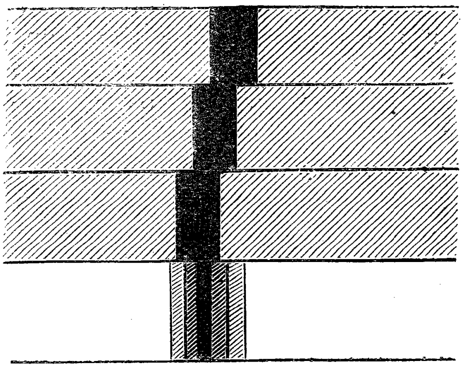
Effect of a Star's Rotation on its Spectrum.

By Capt. W. de W. Abney.

Having privately asked our President at the last meeting if he had considered the effect that would be produced by the rotation of a star on its spectrum, and having received a negative answer, I have ventured to bring the subject before the Society to provoke discussion if possible.

The light which radiates from every part of the visible surface of the star will fall on the slit of the spectroscope; hence a separate spectrum due to every portion of it will be formed. The advancing limb—supposing there is a rotation of the star—will cause the absorption lines to move towards the violet end, and the receding limb towards the red end of the spectrum; whilst the central portion will cause them to occupy their normal positions, provided there be no motion of the star in space.

As an example of what would occur, let us suppose the star's disk to be divided into three equal parts; one of which is advancing towards us, another receding at the same rate, and the third motionless. If we draw an exaggerated diagram of a small part of the spectra given by the light radiating from these three surfaces, we should get a result as shown.



There would be a total broadening of the line, consisting of a sort of double penumbra and a black nucleus. If the displacement was equal to half of the breadth of the line, the double penumbra alone would remain; whilst, if it were equal to the total breadth of the line, there would be only one penumbra. If we suppose the stellar surface to be equally bright throughout, we should get a graduated shade forming the penumbra; which would gradually melt off into the blacker nucleus which would form the line. I have calculated what the shade would be; but I have not thought it necessary to bring forward the formulæ to-night.

It seems, supposing the surface of a quickly rotating star

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to be in the same condition as the Sun as regards gaseous pressure and temperature, that no absorption line due to the former can be as sharp and distinct as it is when seen in the solar spectrum. More than this, rotation might account for the disappearance of some of the finer lines of the spectrum; and perhaps other phenomena observed may be attributable to the same cause. It appears also that, other conditions being known, the mean velocity of rotation might be calculated, or perhaps even the angular velocity. Since Dr. Huggins has commenced taking photographs of the spectra of stars, he may be able to give a thought to these points. I am convinced that from a good photograph much might be determined.

On the Variable Star U Geminorum. By G. Knott, Esq.

Mr. Hind's curious variable star, U *Geminorum*, has recently passed a *maximum*, of which I have obtained the following pretty complete series of observations:—

			h	m		Mag.
1877	February	16	11	40	G.M.T.	14·0
		17	7	30		14·0
		20	8	10		13·2
		21	10	30		9·8
		23	8	45		9·9
		25	10	0		9·9
		26	9	0		9·85
		27	9	0		9·9
		28	7	0		9·9
	March	1	7	35		9·95
		4	11	50		11·2
		5	10	30		11·7
		6	9	0		12·3
		8	8	0		13·7

The maximum was a rather faint one. The colour of the star throughout its apparition was white or bluish white, and on February 27 and March 4 was noted as *hazy*.

Cuckfield.
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